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Abstract

FUTURE ENERGY NEEDS AND THE ROLE OF NUCLEAR POWER

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The six years since the last Geneva Conference have been dynamic ones for the energy industries. Consumption of energy has grown substantially with increasing percentages being used in the form of electricity. Some of the historic production and price trends in the fossil fuel industries have been reversed or greatly altered, and nuclear power has become a significant competitive factor in the electric utility market.

Capital costs for both nuclear and conventional plants have decreased dramatically due both to technological advances and rapid increases in the size of generating units. The cost of coal, the major fuel for electric utilities, has been decreasing and new concepts in coal transportation and power transmission will further reduce the cost of power from conventional plants. Fuel cycle costs for nuclear plants have declined both as a result of technical developments and of two reductions in the Atomic Energy Commission's schedule of charges for enriched uranium. Competition between coal and nuclear power is intense in high fuel cost areas.

Energy requirements and resources, as well as the role of nuclear power, have been studied intensively in the last few years. As a result, the energy situation and future prospects are probably better understood than ever before although substantial areas of uncertainty remain. In the last three years, five major energy studies have been made by or at the request of the Federal Government, including the Atomic Energy Commission's Report to the President on "Civilian Nuclear Power." Many other important studies have been made both within and outside the Government.

The concensus of the forecasts is that total energy consumption in the year 2000 will be triple 1960 consumption. There is general agreement that

coal resources will be adequate for at least well into the next century, but divergent opinions as to the ability of technology to provide these coal resources at or below present costs. U. S. resources of crude oil and natural gas will almost certainly become scarce long before coal, although the domestic supply picture will be substantially improved by imports, shale oil, conversion of coal, or perhaps production of other synthetic fuels with the aid of nuclear power.

Even where there is good agreement as to total energy requirements there is serious disagreement as to the level of electricity demand. Responsible forecasts differ by as much as a factor of two in electricity requirements for the year 2000. Opinions also differ widely as to the rate at which nuclear power will penetrate the electricity market in the next few decades; however, the forecasts agree that by the year 2000 nuclear power will dominate the new plant market and will furnish one-half of the power generated.

In 1962 the Atomic Energy Commission made predictions of the amount of nuclear capacity to be installed through the year 2000. Developments since 1962 indicate that the growth of nuclear power will probably be faster than predicted then. Realization of predicted amounts of nuclear power are dependent upon further advances in water reactor technology and the development of advanced convertor and breeder technology. The direct economic benefits of the installation of nuclear power will be many billions of dollars by the year 2000. Substantial additional benefits will result from the stimulation of competitive fuels to reduce costs, the reduction of atmospheric pollution, the extension of resources, and the promotion of international trade.